M30200T-RPD-E

Emulation Pod forM16C/20 Series

User's Manual

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  Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

For inquiries about the contents of this document or product, fill in the text file the installer of the emulator debugger generates in the following directory and email to your local distributor.

\SUPPORT\Product-name\SUPPORT.TXT

Renesas Tools Homepage http://www.renesas.com/en/tools

Preface

The M30200T-RPD-E is an emulation pod main unit for M16C/20 Series of Renesas 16-bit microcomputers. The M30200T-RPD-E is used by connecting to the pod probe M302xxT-PRB and the PC4701 emulator main unit, and is controlled by the emulator debugger.

This manual mainly explains specifications and setting up of the M30200T-RPD-E. For detail information about the pod probe, the PC4701 emulator main unit and the emulator debugger, refer to each user's manual.

To check the components of this product, refer to "Things to Check When Unpacking" in this manual. If there is any question or doubt about this product, contact your local distributor.

To use the product properly

Precautions for Safety:

- Both in this User's Manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.
- The icons' graphic images and meanings are given in Chapter 1 Precautions for Safety. Be sure to read this chapter before using the product.

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Summary

Chapter 1. Precautions for Safety

This chapter describes the precautions which should be taken in order to use M30200T-RPD-E safely and properly. Refer to each manual of the pod probe, the emulator main unit and the emulator debugger for their precautions.

Chapter 2. Introduction

This chapter provides the system configuration and overview of M30200T-RPD-E.

Chapter 3. Specifications

This chapter lists the product specifications of M30200T-RPD-E.

Chapter 4. Setting Up

This chapter describes how to set up the M30200T-RPD-E hardware according to your system.

Chapter 5. Connection

This chapter describes how to connect the M30200T-RPD-E, emulator main unit and pod probe. For connection between the host machine and emulator main unit, connection between the pod probe and the target system, and installation of the emulator debugger, refer to each user's manual of the products.

Chapter 6. External Dimensions

This chapter shows the external dimensions of M30200T-RPD-E and its probe.

Chapter 7. Maintenance and Warranty

This chapter describes maintenance and warranty of M30200T-RPD-E.

Chapter 8. Troubleshooting

This chapter describes what to do when the emulation pod main unit does not work properly.

Terminology

Some specific words used in this User's Manual are defined as follows:

Emulator system

This means an emulator system built around a PC4701 emulator. The PC4701 emulator system is configured with the emulator main unit, emulation pod main unit, pod probe, host machine, and emulator debugger.

Emulator main unit PC4701

This means a generic name for emulators for 8 and 16-bit MCUs. For details on specific models of PC4701, visit Renesas Tools Homepage at http://www.renesas.com/en/tools

Emulation pod main unit

This means M30200T-RPD-E (this product). This emulation pod main unit is for M16C/20 series MCUs.

Pod probe

This means a pod probe equipped with an MCU for each group of M16C/20 Series.

Host machine

This means a personal computer used to control the emulator and emulation pod.

Emulator debugger

This means the following software tool to control the emulator from the host machine through an interface (serial, parallel, LPT parallel or LAN).

Emulator debugger M3T-PD30 V.4.00 or later

Firmware

This means a program that analyzes contents of communication with the emulator debugger and controls the emulator hardware. The emulator contains an EEPROM. You can download from the emulator debugger when upgrading the version of the firmware itself or when handling another MCU.

Target MCU

This means the microcomputer you are going to debug.

Target system

This means a user's application system using the microcomputer to be debugged.

Things to Check When Unpacking

The M30200T-RPD-E consists of the following parts and manuals. When unpacking, check to see if your M30200T-RPD-E package contains all of these items.

Type name	Description	Quantity
M30200T-RPD-E	Emulation pod main unit	1
FLX120-RPD	Flexible cable for connecting PC4701 emulator	1
FLX64-PRB	Pitch converter board for connecting the pod probe (pre-installed)	1
OSC-3 (10 MHz)	Oscillator circuit board (pre-installed)	1
OSC-2 (32 MHz)	Oscillator circuit board (pre-installed)	1
OSC-2	Oscillator circuit bare board	1
M30200T-RPD-E English user's manual	English user's manual (this manual)	1
M30200T-RPD-E Japanese user's manual	Japanese user's manual	1

Please keep the M30200T-RPD-E's packing box and cushion material in your place for reuse at a later time when sending your product for repair or other purposes. Always use these packing box and cushion material when transporting the products.

If any of these items are missing or found faulty, please contact your local distributor. Also, if there is any question or doubt about the packaged product, contact your local distributor.

Other tool products required for this product:

- Emulator main unit: PC4701 (essential)
- Pod probe with an MCU for M16C/20 Series: M302xxT-PRB (essential)
- Emulator debugger: M3T-PD30 (essential)
- PROM programming adapter: PCA7302xxx-xx

To purchase the products listed above, contact your local distributor.

Chapter 1. Precautions for Safety

In both the user's manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.

This chapter describes the precautions which should be taken in order to use this product safely and properly. Be sure to read this chapter before using this product.

1.1 Safety Symbols and Meanings

⚠ **WARNING**	If the requirements shown in the "WARNING" sentences are ignored, the equipment may cause serious personal injury or death.
⚠ **CAUTION**	If the requirements shown in the "CAUTION" sentences are ignored, the equipment may malfunction.
IMPORTANT	It means important information on using this product.

In addition to the three above, the following are also used as appropriate.

△ means WARNING or CAUTION.

Example: ⚠ **CAUTION AGAINST AN ELECTRIC SHOCK**

⃠ means PROHIBITION.

Example: **DISASSEMBLY PROHIBITED**

● means A FORCIBLE ACTION.

Example: **UNPLUG THE POWER CABLE FROM THE RECEPTACLE.**

The following pages describe the symbols "WARNING", "CAUTION", and "IMPORTANT".

⚠ WARNING

Warning for Installation:

- Do not set this product in water or areas of high humidity. Make sure that the emulation pod main unit does not get wet. Spilling water or other liquids into the emulation pod main unit can cause an unrepairable damage.

Warning for Use Environment:

- The emulation pod main unit is air-cooled with the ventilation slot. Therefore, do not block the ventilation slot. When heated to high temperatures, the emulation pod main unit may not work properly.
- This equipment is to be used in an environment with a maximum ambient temperature of 35℃. Care should be taken that this temperature is not exceeded.

⚠ CAUTION

Caution to be Taken for Modifying This Product:

- Do not disassemble or modify this product. Disassembling or modifying this product can cause damage. Disassembling and modifying the product will void your warranty.

Cautions to be Taken for This Product:

- Use caution when handling the emulation pod main unit. Be careful not to apply a mechanical shock.
- Do not touch directly the connector pins of the emulator main unit or the target MCU connector pins with your hand.
- Do not pull the emulation pod main unit by the FLX120-RPD flexible cable or the FLX64 flexible cable.
- The flexible cables FLX120-RPD and FLX64 are different from earlier models. The slits make them more flexible. However, excessive flexing or force may break conductors.
- Do not use inch-size screws for this equipment. The screws used in this equipment are all ISO (meter-size) type screws. When replacing screws, use same type screws as used on the equipment.

IMPORTANT

Notes on PC4701 Emulator Main Units:

- EMI standards are not met when this product is used with the PC4700H or PC4700L emulator main unit.
- The PC4700H emulator main units whose serial number ends with a number cannot be used with M30200T-RPD-E. Use only products whose serial number ends with a letter of the alphabet. The serial number is on the bottom of the PC4700H.

  Example: 5KE100 ..... Can NOT be used with M30200T-RPD-E. Requires an upgrade.
  Example: 5LE123B ..... Can be used with M30200T-RPD-E.
- Do not turn off the power when downloading firmware. If the emulator is powered off in the middle of the process, it will become unable to start up normally. In cases when the power is inadvertently shut off, re-execute downloading.

Note on Abnormal Operation of PC4701 System:

- If the PC4701 system does not pass all self-checks (excluding when an target system error occurs), there is the possibility of trouble in the system. In such case, contact the place of purchase. (Self-check should be executed when the target system is not connected.)
- If the emulator main unit malfunctions due to external interference or some other causes, follow the steps given below.

  (1) Press the system reset switch located on the front panel of the emulator main unit.
  (2) If the emulator does not return to the normal operation despite the step (1) above, turn off the power source of the emulator main unit, turn it on again.

Notes on the Target System:

- Because the emulation pod main unit does not have the capacity to supply power to other devices, design your system so that the emulator MCU is powered by the target system.
- Make sure that the target's supply voltage is 2.7 to 5 V.
- Before turning on power to anything, check the host machine, emulator main unit, emulation pod main unit, pod probe, converter board and user's target system are properly connected. As explained here following, activate power to units as simultaneously as possible. Reverse the procedure to turn them off.

  (1) Turn on the target system.
  (2) Turn on the emulator main unit.

IMPORTANT

Notes on Connecting Pod Probe and Pitch Converter Board:

- Prepare the right pod probe for your MCU. Without a pod probe this product cannot be used.
- When connecting the pod probe and the pitch converter board, be careful not to forcibly press the connector top of the converter board. (The flexible cable and the converter board are guaranteed for only 20 insertion/removal iterations.)
- Especially be careful not to insert the converter board in the wrong direction.

Note on Starting Up the Emulator System:

- Check the emulator starts up properly from the target status LEDs on the front panel of the emulator main unit itself.

  When power is received from the target system: ... The POWER target status is ON.
  When the clock starts oscillating: ..... The CLOCK target status is ON.
  When the reset is released: ..... The RESET target status is OFF.

  If the LEDs behave as described above within approximately 5 seconds of turning ON the power, the emulator has started up properly.

Notes on Reset Input from the Target System:

- The reset input from the target system is accepted only during program execution (while the RUN signal LED on the PC4701 is lit).

IMPORTANT

Note on Address 0 Access:

- With the M16C/20 series MCU, when a maskable interrupt is generated, the interrupt data (interrupt No. and interrupt request level) stored in address 0 is read out. Also, the interrupt request bit is cleared when address 0 is read out. Consequently, when the address 0 read-out instruction is executed or when address 0 is read out in the cause of a program runaway, a malfunction occurs in that the interrupt is not executed despite the interrupt request, because the request bit of the highest priority interrupt factor enabled is cleared.

Note on Differences between Actual MCU and Emulator:

- Emulator operation differs from mask MCU operation, as listed below:

  (1) Initial values of internal resource data at power-on
  (2) Internal ROM and RAM capacities, etc.
  (3) A/D converter

  A/D converter characteristics differ from actual MCU characteristics because the flexible cable and other elements are used between the emulation MCU and target system.

Note on Referencing and Setting the Work Area:

- The work area given below is assigned as the initial setting at the time of starting up the emulator debugger.

  $02C00_{16}$ to $02C0F_{16}$: Work area

Notes on MAP References and Settings:

- When starting up M30200T-RPD-E, initial MAP settings are as follows.

  00000_{16} to $003FF_{16}$: EXT
  00400_{16} to $FFFFF_{16}$: INT

- Always set the SFR area to EXT (external).

Note on Changing Settings of the Memory Area:

- To debug an MCU different in memory capacity, be sure to modify the settings in the memory area before using the MCU. For memory maps of respective MCUs, see the MCU User's Manual.

IMPORTANT

Note on Stack:

- This product uses up to 8 bytes for stack.

Note on BRK Instruction:

- BRK instruction cannot be used.

Note on Software Break and Hardware Break:

- A software break and a hardware break cannot be used simultaneously. If they are used simultaneously, the emulation pod main unit may not work properly.

Notes on Using Address-match Interrupts:

- Do not set software breaks at the same addresses as address-match interrupts as the program may run out of control.
- Do not set a hardware break within 4 instructions before an address at which an address-match interrupt occurs. If you do set a hardware break in this range, the program will run out of control.
- When an address at which an address-match interrupt occurs is executed in one-step mode, the program stops after executing the first instruction after returning from the address-match interrupt processing.

Note on Software Reset:

- Do not use the software reset. It may not work properly.

Note on Stop and Wait Modes:

- Do not perform step execution at addresses in the stop or wait mode. It may cause communication errors.

Note on Watchdog Function:

- Debug functions such as a single step cannot be used while using the watchdog function. Only GO command (program execution) is possible. To use other debug functions, disable the watchdog function.

Chapter 2. Introduction

M30200T-RPD-E is used by connecting to the PC4701 emulator main unit. Figure 2.1 shows the system configuration.

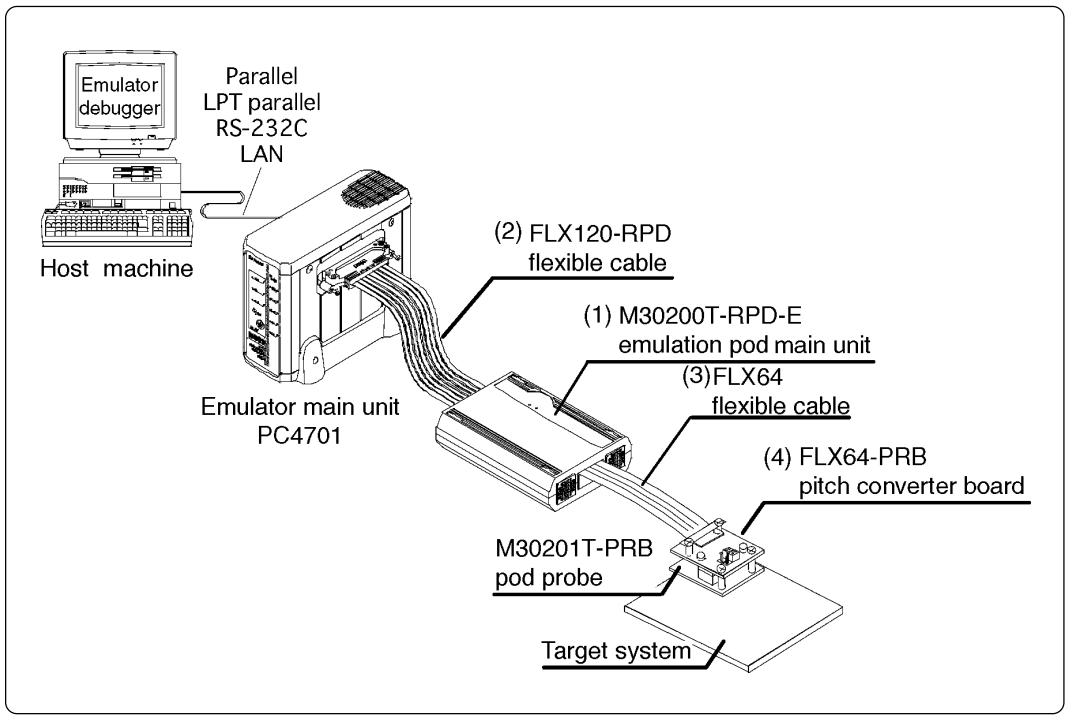


Figure 2.1 System configuration

Products (1) to (4) shown in Figure 2.1 are included with this product.

(1) M30200T-RPD-E (Emulation pod main unit)

This emulation pod main unit contains emulation memory and debugging functions.

(2) FLX120-RPD (Flexible cable)

This 120-pin flexible cable connects the PC4701 emulator main unit and emulation pod main unit.

(3) FLX64 (Flexible cable)

This 64-pin flexible cable connects the emulation pod main unit and pod probe.

(4) FLX64-PRB (Pitch converter board)

This board connects the 64-pin flexible board and pod probe.

Chapter 3. Specifications

Table 3.1 lists the specifications of M30200T-RPD-E.

Table 3.1 Specifications of M30200T-RPD-E

Usable emulator main unit	PC4701
Usable MCU	M16C/20 Series MCUs
Usable MCU mode	Single-chip mode
Emulation memory	1 MB
Clock	Xin: 10 MHz Xcin: 32.768 kHz
Power supply range	+2.7 to 5.5 V
Stack capacity used for emulator	Up to 8 bytes
Suspended cycles in run-time debug	16-byte dump: Approx. 312 BCLK cycle 16-byte fill: Approx. 283 BCLK cycle
Power supply to emulation pod	1. Supplied from an emulator main unit 2. The operating voltage of the emulation pod main unit is determined by detecting the supply voltage of the target system. When no target system is connected, or when the supply voltage of the target system is more than 5.0 V, the operating voltage is 5.0 V.
Operating temperature range	5 to 35℃ (no dew)
Storage temperature range	-10 to 60℃ (no dew)
Overseas standards	(1) U.S. EMI standards (FCC part 15 Class A) (2) CE marking (EN55022, EN50082-1)

Chapter 4. Setting Up

4.1 Removing the Upper Cover

If you need to change the input frequency, remove the upper cover of the product to change the configuration.

(1) Remove the four screws of both sides and lift off the upper cover. (see Figure 4.1)

(2) Change the input frequency following the instructions shown below.

(3) Replace the upper cover and tighten the four screws.

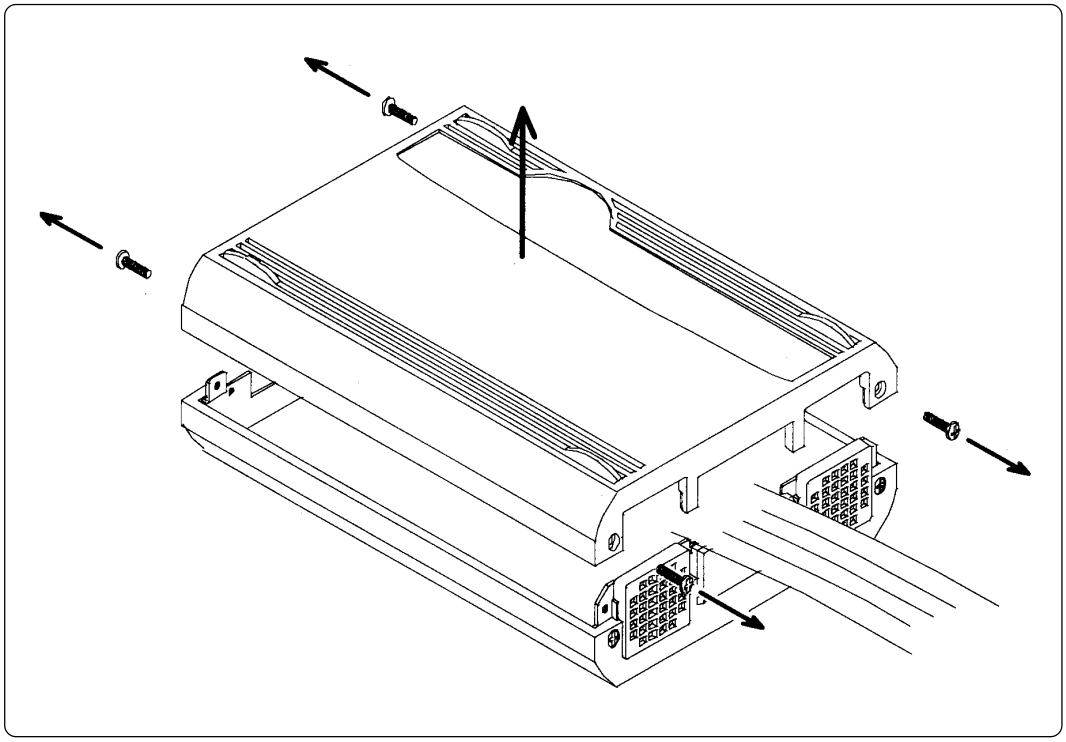


Figure 4.1 Removing the upper cover

⚠Caution

Before Removing the Upper Cover:

- Always shut OFF power before removing the cover and changing the oscillator circuit board. Removing the cover and setting switches in the power ON state could destroy internal circuits.

4.2 Setting Oscillation Frequency

When you are using the emulation pod main unit's internal oscillator, see (1) below, and when you are using the target system's oscillator, see (2) on page 21.

(1) Using emulation pod main unit's oscillator

M30200T-RPD-E is available with two types of internal oscillator circuits:

• OSC-3 oscillator circuit board (default when shipped): Xin = 10 MHz

• OSC-2 oscillator circuit board (bare board)

a. OSC-3 oscillator circuit board

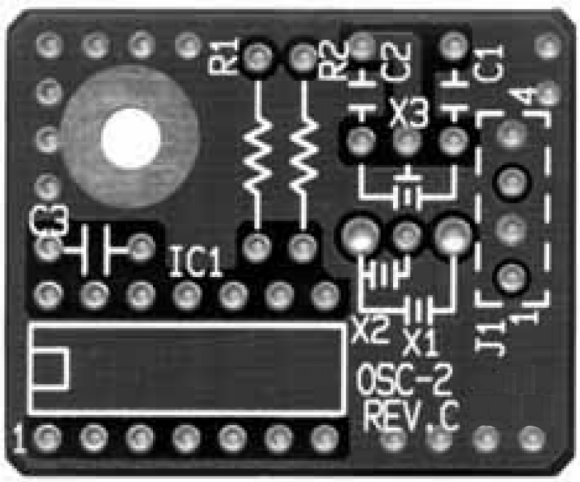
M30200T-RPD-E is equipped with a 10MHz internal oscillator circuit board (OSC-3). If you are running M30200T-RPD-E at 10 MHz, you can use the OSC-3 oscillator circuit board.

b. OSC-2 oscillator circuit board

M30200T-RPD-E is supplied with the OSC-2 oscillator circuit bare board (connector pin mounted).

If you are using M30200T-RPD-E with internal oscillation frequencies other than 10 MHz, create the desired oscillator circuit on the OSC-2 bare board and replace the OSC-3 board with the OSC-2 board.

Figure 4.2 shows the external view and connector pin layout of the OSC-2 oscillator circuit board.



J1-4: GND

J1-3: Oscillator output

J1-2: GND

J1-1: Vcc

Figure 4.2 External view of oscillator bare board OSC-2 and connector pin layout of OSC-2

Figure 4.3 shows the OSC-2 circuit. Use the circuit constants recommended by the manufacturer of the oscillator.

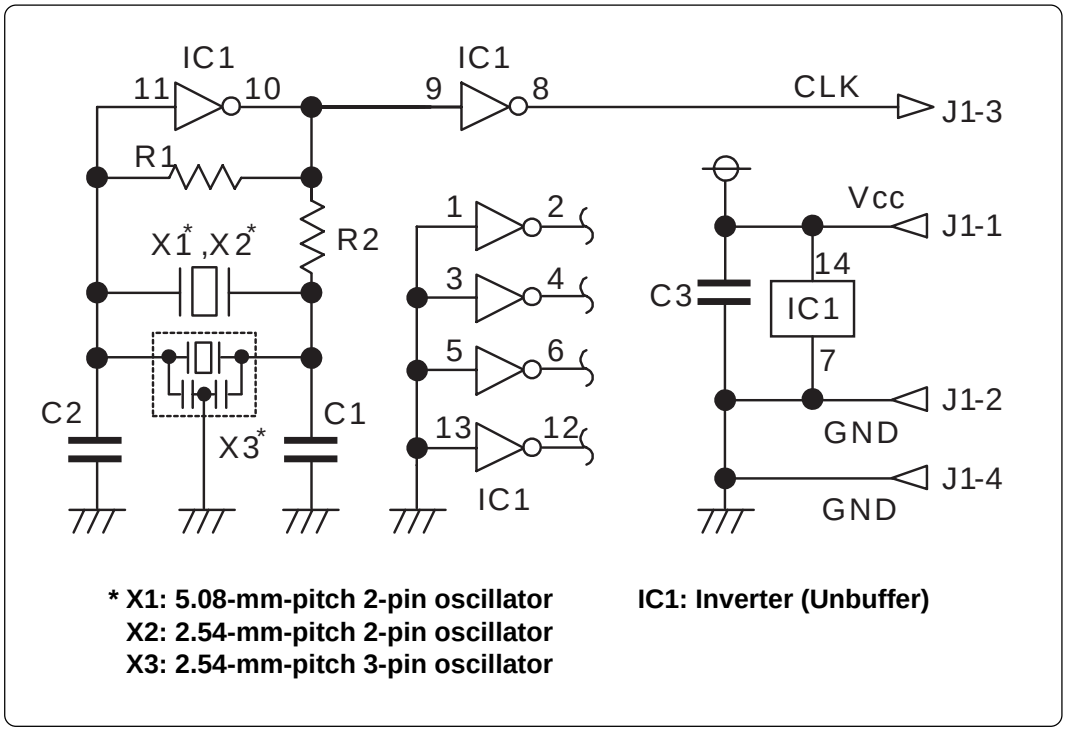
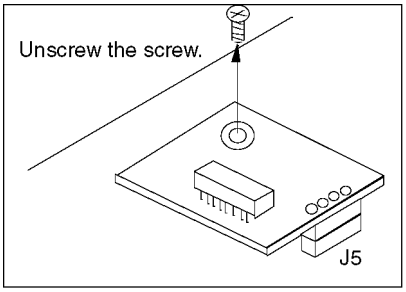
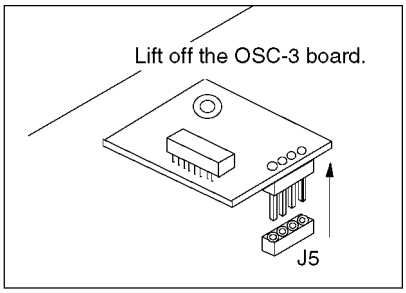


Figure 4.3 Circuit of oscillator board OSC-2

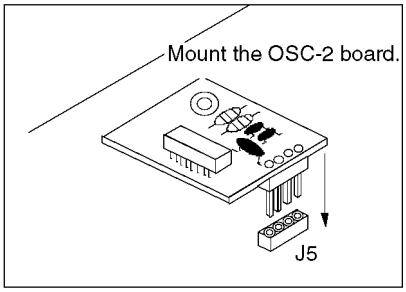
How to replace the oscillator circuit board is shown in Figure 4.4 below.



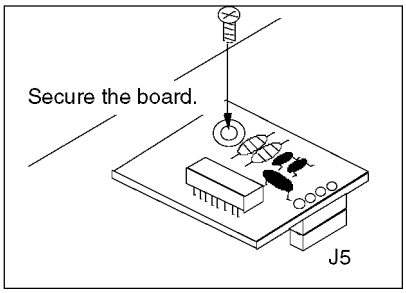
(1) Unscrew the screw securing the oscillator circuit board.



(2) Lift off the OSC-3 board.



(3) Mount the J1 connector of the OSC-2 board into the J5 connector of the M30200T-PRT board.



(4) Secure the OSC-2 board with the screw.

Figure 4.4 Replacing small oscillator circuit boards

(2) Using target system's oscillator

a. To operate the emulator with an external clock, construct the oscillation circuit shown in Figure 4.5 in the target system and input the oscillation output at 40-60% duty into the Xin (Xcin) pin.

b. Make note of the fact that in the oscillation circuit shown in Figure 4.6 where a resonator is connected between the Xin (Xcin) and Xout (Xcout) pins, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the target system.

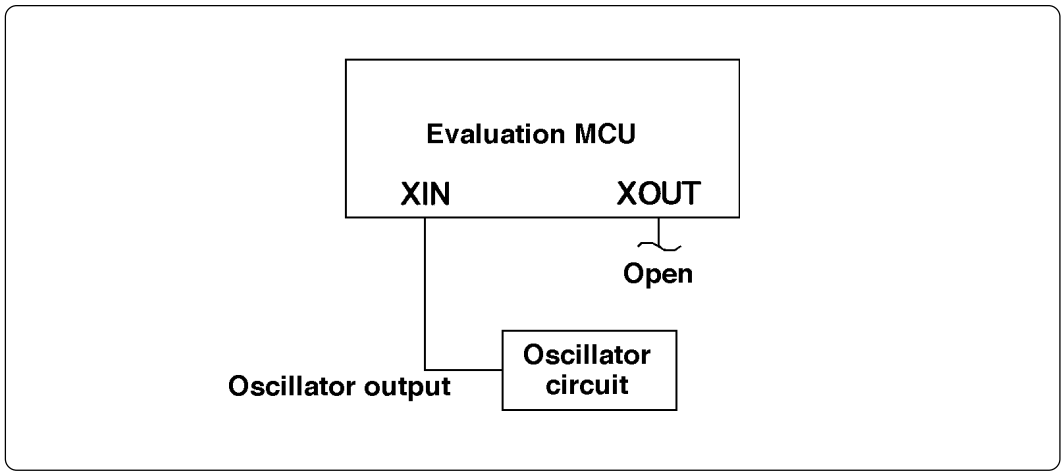


Figure 4.5 External oscillator circuit

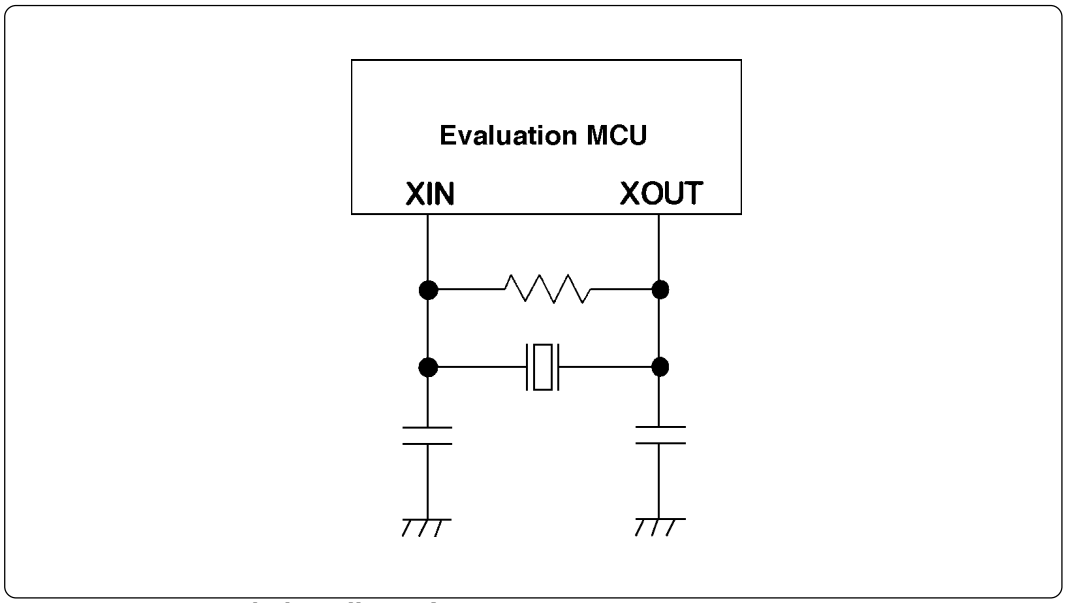


Figure 4.6 Circuit in which oscillation does not occur

Chapter 5. Connection

5.1 Connection to the Emulator Main Unit

Use the FLX120-RPD 120-pin flexible cable (included with the package) to connect the emulator main unit and M30200T-RPD-E. Figure 5.1 shows how to connect the emulator main unit and FLX120-RPD.

Install the FLX120-RPD connector (emulator PC4701 side) on the cable connector of the PC4701. To insert the FLX120-RPD connector, hold the cover of the connector with the "UPSIDE" label facing up. Then fix the screws of the cover of the connector.

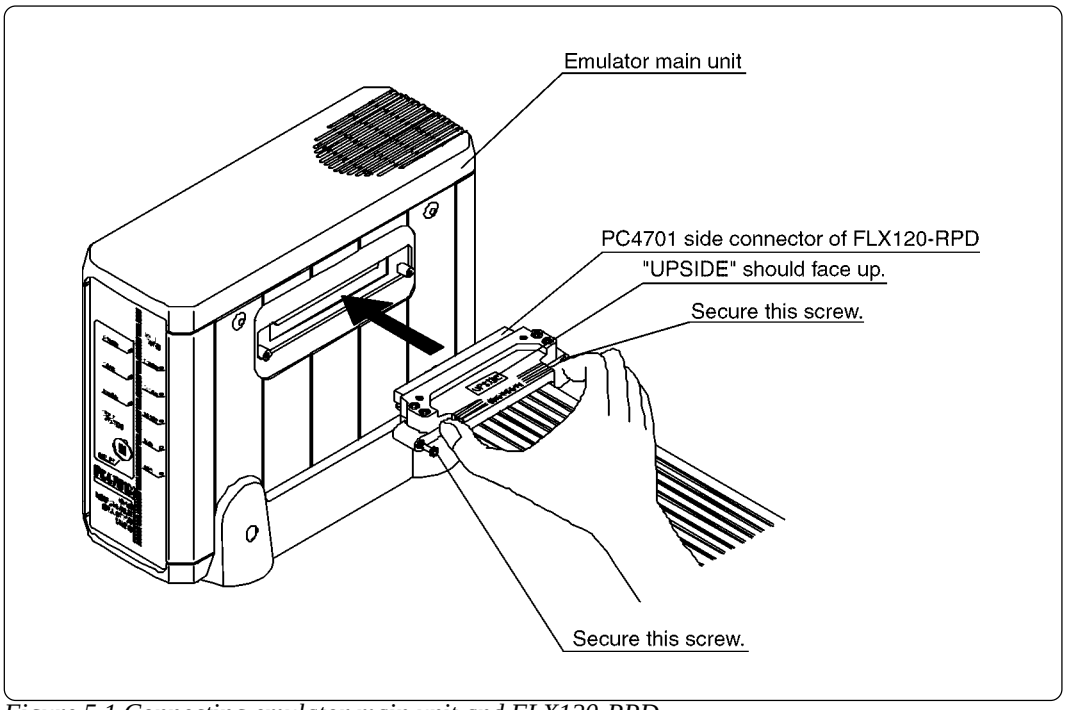


Figure 5.1 Connecting emulator main unit and FLX120-RPD

⚠ Caution

Note on Connecting the Cable:

- Be sure to turn off the power before making connections. Otherwise, the internal circuits may be damaged.

5.2 Connection to the Emulation Pod

Attach the FLX120-RPD to M30200T-RPD-E, then secure them with the screws. Figure 5.2 shows how to connect M30200T-RPD-E and FLX120-RPD.

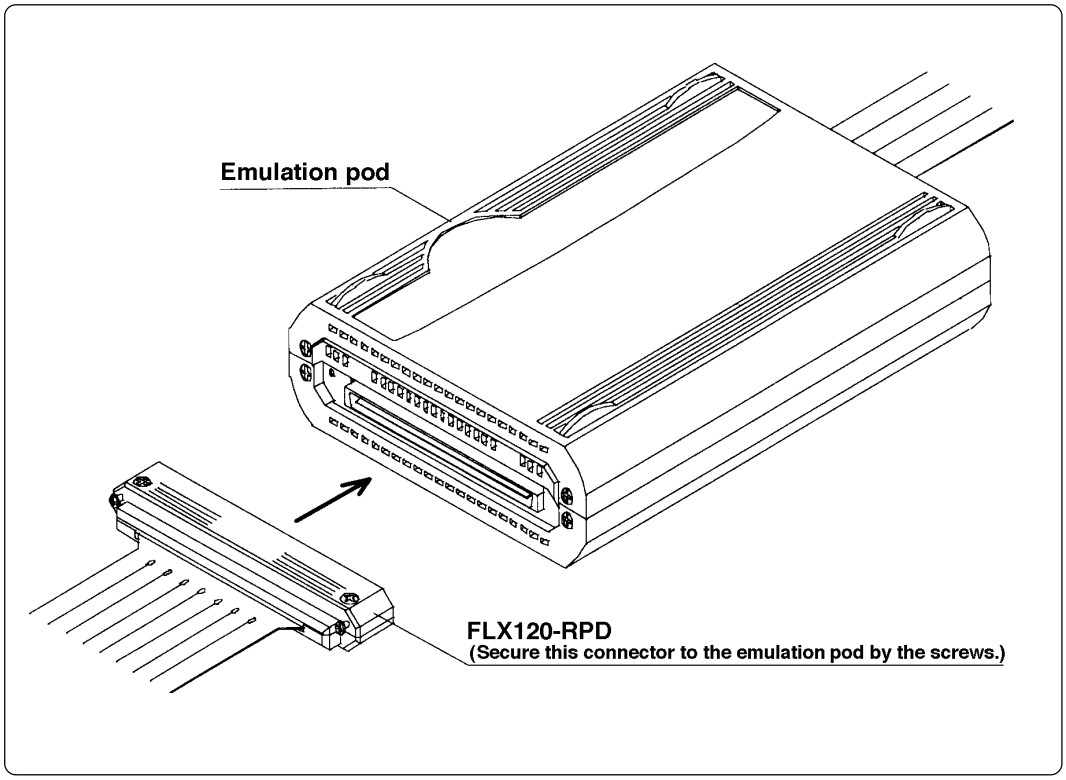


Figure 5.2 Connecting emulation pod and FLX120-RPD

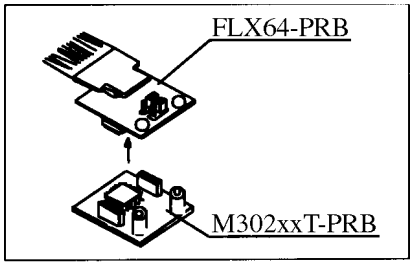
⚠ Caution

Note on Connecting the Cable:

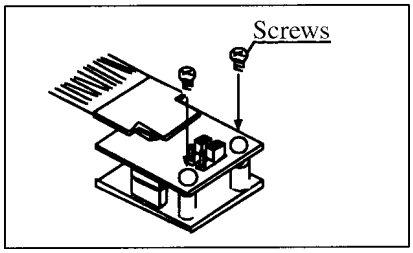
- Be sure to turn off the power before making connections. Otherwise, the internal circuits may be damaged.

5.3 Connection to the Pod Probe

The emulation pod for M16C/20 Series consists of the M30200T-RPD-E emulation pod main unit and the M302xxT-PRB pod probe. Figure 5.3 shows how to connect the M302xxT-PRB pod probe. And Figure 5.4 shows how to remove it.

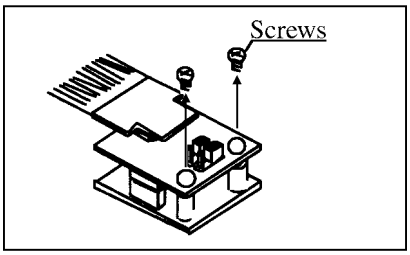


(1) Attach the J1 and J2 connectors of M302xxT-PRB to the J3 and J4 connectors of FLX64-PRB respectively.

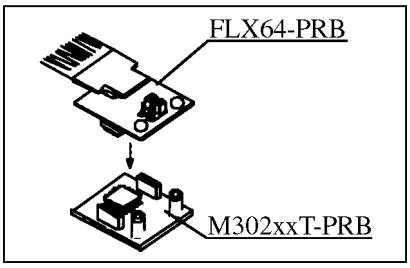


(2) Secure the FLX64-PRB with the two screws.

Figure 5.3 Connecting the M302xxT-PRB pod probe



(1) Unscrew the two screws of M302xxT-PRB.



(2) Lift off the M302xxT-PRB from the FLX64-PRB. Pull the M302xxT-PRB straight down, being careful not to break the connector.

Figure 5.4 Removing the M302xxT-PRB pod probe

⚠ Caution

Note on Connecting the Cable:

- Be sure to turn off the power before making connections. Otherwise, the internal circuits may be damaged.
- The small connectors (J3 and J4) of M302xxT-PRB are guaranteed for only 20 insertion/removal iterations.
- The small connectors (J3 and J4) of FLX64-PRB and the small connectors (J1 and J2) of M302xxT-PRB are guaranteed for only 50 insertion/removal iterations.

Chapter 6. External Dimensions

Figures 6.1 shows external dimensions of M30200T-RPD-E.

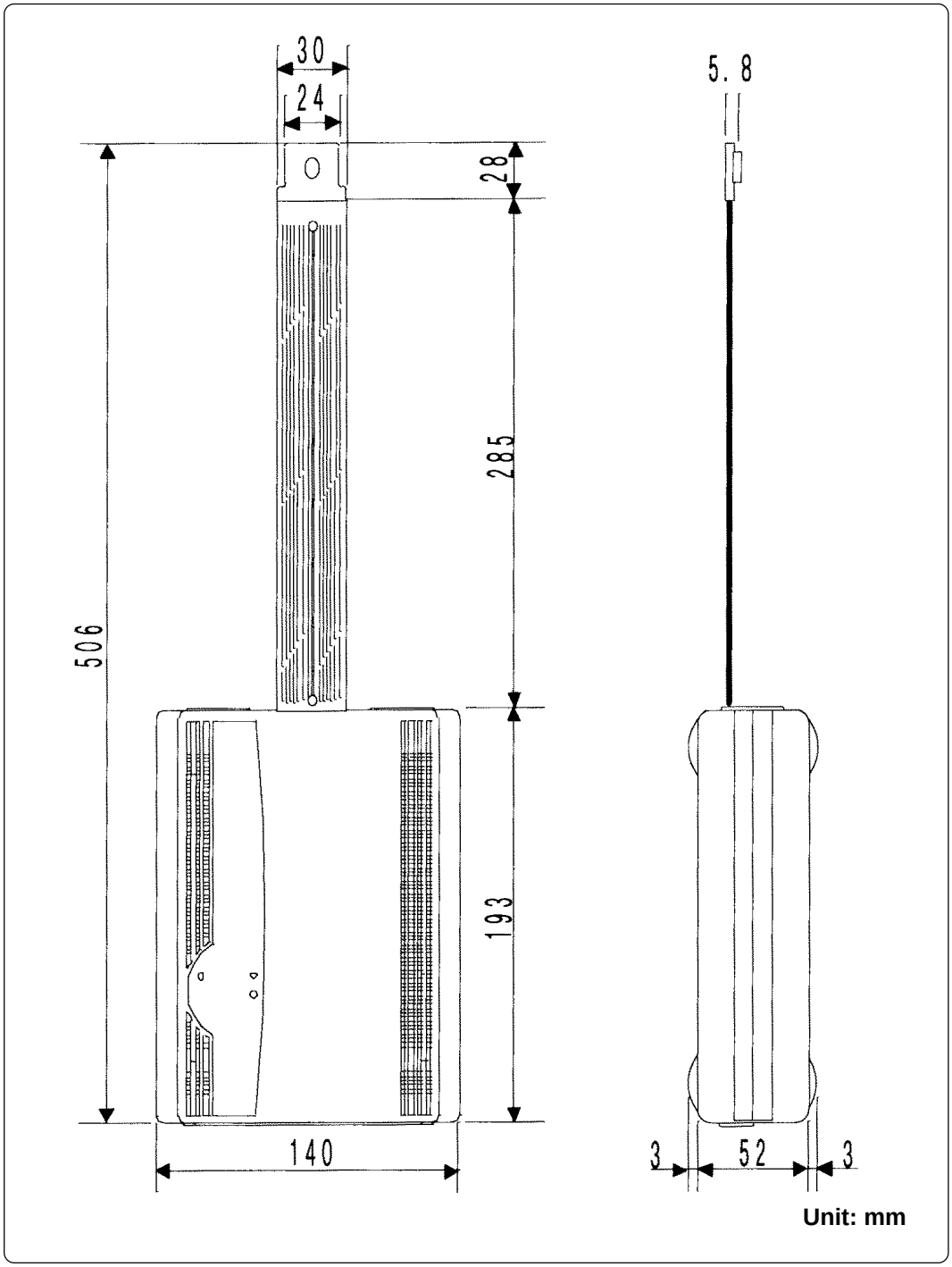


Figure 6.1 External dimensions of M30200T-RPD-E

Figures 6.2 shows external dimensions of the FLX64-PRB pitch converter board for connecting to the pod probe.

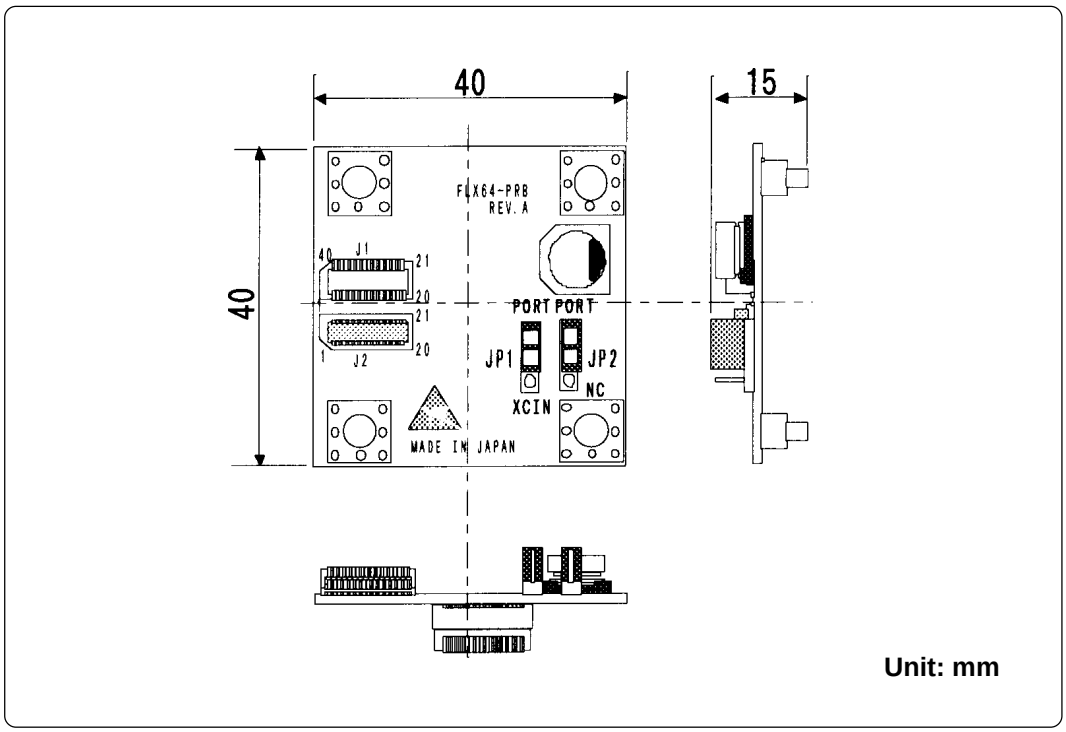


Figure 6.2 External dimensions of FLX64-PRB

Chapter 7. Maintenance and Guarantee

7.1 Maintenance

If dust or dirt collects on any equipment of your emulation system, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the equipment's surface coating to separate.

7.2 Guarantee

If your product becomes faulty within twelve months after its purchase while being used under good conditions by observing "Precautions for Safety" described in Chapter 1 of this user's manual, we will repair or replace your faulty product free of charge. Note, however, that if your product's fault is raised by any one of the following causes, we will repair it or replace it with new one with extra-charge:

- Misuse, abuse, or use under extraordinary conditions
- Unauthorized repair, remodeling, maintenance, and so on
- Inadequate user's system or misuse of it
- Fires, earthquakes, and other unexpected disasters

In the above cases, contact your local distributor. If your product is being leased, consult the leasing company or the owner.

7.3 Repair Provisions

(1) Repair with extra-charge

The products elapsed more than twelve months after purchase can be repaired with extra-charge.

(2) Replacement with extra-charge

If your product's fault falls in any of the following categories, the fault will be corrected by replacing the entire product instead of repair, or you will be advised to purchase new one, depending on the severity of the fault.

- Faulty or broken mechanical portions
- Flaw, separation, or rust in coated or plated portions
- Flaw or cracks in plastic portions
- Faults or breakage caused by improper use or unauthorized repair or modification
- Heavily damaged electric circuits due to overvoltage, overcurrent or shorting of power supply
- Cracks in the printed circuit board or burnt-down patterns
- Wide range of faults that makes replacement less expensive than repair
- Unlocatable or unidentified faults

(3) Expiration of the repair period

When a period of twelve months elapses after the model was dropped from production, repairing products of the model may become impossible.

(4) Transportation fees at sending your product for repair

Please send your product to us for repair at your expense.

7.4 How to Request for Repair

If your product is found faulty, follow the procedure below to send your product for repair.

Customer

Fill in the Repair Request Sheet included with this product, then send it along with this product for repair to your local distributor. Make sure that information in the Repair Request Sheet is written in as much detail as possible to facilitate repair.

Distributor

After checking the contents of fault, the distributor should please send the faulty product along with the Repair Request Sheet to Renesas Solutions Corp.

Renesas Solutions

When the faulty product is repaired, it will be returned to the customer at the earliest convenience.

⚠ CAUTION

Note on Transporting the Product:

- When sending your product for repair, use the packing box and cushion material supplied with this product when delivered to you and specify handling caution for it to be handled as precision equipment. If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use conductive polyvinyl supplied with this product (usually a blue bag). When you use other bags, they may cause a trouble on your product because of static electricity.

Chapter 8. Troubleshooting

When the M30200T-RPD-E does not work properly, check the items listed below.

(1) The emulator main unit cannot be powered up.

- ☐ Check to see if the AC power cord is firmly plugged into the receptacle.
- ☐ Check to see if the AC power 3P-2P converting connector is firmly connected.

(2) The M30200T-RPD-E does not start up when the target system is connected with the PC4701 system. (The Error LED of the emulator main unit lights up.)

- ☐ Check (1) described above.
- ☐ Check whether the emulator main unit and the FLX120-RPD are firmly connected.
- ☐ Check whether the FLX120-RPD and the M30200T-RPD-E are firmly connected.
- ☐ Check whether the M30200T-RPD-E and the pod probe are firmly connected.
- ☐ Check whether the converter board and the target system are firmly connected.
- ☐ Check whether the power and GND are supplied to the target system.
- ☐ Check whether switches of the pod probe are properly set. (For details, refer to the user's manual of the pod probe.)
- ☐ Check whether the RESET pin is held 'HIGH' when the target system is connected.
- ☐ Check whether the oscillator circuit of the target system is oscillating correctly when using the oscillator of the target system.
- ☐ Check whether proper firmware is downloaded in the emulator main unit. (Refer to the user's manual of the emulator debugger about how to download firmware.)

When the condition does not improve even if you check the items above, troubles described below are considered.

(1) Trouble of the evaluation MCU

(2) Trouble of the M30200T-RPD-E

(3) Trouble of the PC4701 emulator main unit

MEMO

M30200T-RPD-E User's Manual

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